Template for ISB Documentation of Stressors

A. General Information:

1. Name or Location of Example/Approach: Multiple lines of evidence for evaluating stressors (used in Australia)

2. Literature/Citations Used:

Norris, R., Liston, P., Mugodo, J., Nichols, S. Quinn, G., Cottingham, P., Metzeling, L., Perriss, S., Robinson, D., Tiller, D. and Wilson, G. (2005). Multiple Lines and Levels of Evidence for detecting ecological responses to management intervention. In I.D. Rutherfurd, I. Wiszniewski, M.J. Askey-Doran and R. Glazik (Eds), Proceedings of the 4th Australian Stream Management Conference: linking rivers to landscapes, (pp. 456-463). Department of Primary Industries, Water and Environment, Hobart, Tasmania, Australia

Norris R., Nichols S., Ransom G., Webb A., Stewardson M., Liston P. and Mugodo J. 2008. Causal criteria analysis methods manual: a systematic approach to evaluate causality in environmental science. eWater Cooperative Research Centre, Canberra..

3. Reviewer(s): V. Resh

B. Specific Questions:

1. What stressors are considered? Water quality and flow alterations

2. Are stressors categorized? If so, how? Flow reduction is categorized so multiple studies can be compared using causal criteria

3. Are the relations between stressors and management objectives modeled, and if so, how? A conceptual model is developed in which quantifiable causes and quantifiable effects are developed.

4. If stressors are prioritized, describe the general approach.

5. How might this approach be relevant to Bay Delta? This multiple lines of evidence approach involved comparing results for richness and abundance of fish, benthic macroinveretebrates, stream metabolism and plants to look for consistent patterns. In the "POD" report, there are several examples of this type of information, some of it conflicting, where this type of approach could be useful.

6. Follow up regarding additional questions/literature review/etc?

Publications on using this approach have generally been confined to analyzing single stressors (e.g. also fire and sedimentation, see references below) but it certainly has the potential to be useful (perhaps more so than the USEPA CADDIS approach, which is in development as well0 in separating multiple stressor effects. Other literature includes—

Greet, J., A.A. Webb, and R.D. Cousins. In Press. The importance of seasonal flow timing for riparian vegetation dynamics: a systematic review using causal criteria analysis. Freshwater Biology.

Harrison, E.T., R.H. Norris, and S.N. Wilkinson. In Review. Evidence for responses of macroinvertebrate community structure to fine sediment accumulation and transport **:** a causal analysis review. Freshwater Biology.